

August 8, 2001

Mr. Robert P. Powers, Senior Vice President  
Indiana Michigan Power Company  
Nuclear Generation Group  
500 Circle Drive  
Buchanan, MI 49107

SUBJECT: DONALD C. COOK NUCLEAR PLANT, UNITS 1 AND 2 - CLOSEOUT OF LICENSING ACTION FOR GENERIC LETTER 96-05, "PERIODIC VERIFICATION OF DESIGN-BASIS CAPABILITY OF SAFETY RELATED MOTOR-OPERATED VALVES" (TAC NOS. M97037 AND M97038)

Dear Mr. Powers:

On September 18, 1996, the NRC issued Generic Letter (GL) 96-05, "Periodic Verification of Design-Basis Capability of Safety-Related Motor-Operated Valves," requesting each nuclear power plant licensee to establish a program, or to ensure the effectiveness of its current program, to verify on a periodic basis that safety-related motor-operated valves (MOVs) continue to be capable of performing their safety functions within the current licensing bases of the facility.

On November 7, 1996, American Electric Power Company (AEP) submitted a 60-day response to GL 96-05 notifying the NRC that it planned to meet the intent of GL 96-05 at D. C. Cook Nuclear Plant, Units 1 and 2. On April 18, 1997, AEP submitted a 180-day response to GL 96-05, providing a summary description of the MOV periodic verification program to be implemented at D. C. Cook. In submittals dated January 11, and December 15, 2000, AEP updated its plans for implementing GL 96-05. On May 14 to 18, 2001, the NRC staff conducted an inspection at D. C. Cook to determine whether AEP's MOV program is consistent with its commitments in response to GL 96-05. The staff documented the results of the GL 96-05 inspection at D. C. Cook in Inspection Report No. 50-315 and 50-316/01-05 (DRS), dated June 12, 2001. In response to an NRC staff finding during that inspection, AEP provided a specific commitment in a letter dated June 22, 2001, to implement the Joint Owners Group (JOG) Program on MOV Periodic Verification as part of its response to GL 96-05.

The NRC staff has reviewed your submittals and applicable NRC inspection reports for the MOV program at D. C. Cook. The staff finds that you have established an acceptable program to verify periodically the design-basis capability of the safety-related MOVs at D. C. Cook, based on our understanding of your commitment to all three phases of the JOG Program on MOV Periodic Verification, and the additional actions described in your submittals and the applicable NRC inspection reports.

As discussed in the enclosed safety evaluation (SE), the staff concludes that you are adequately addressing the actions requested in GL 96-05. The NRC staff may conduct additional inspections at D. C. Cook to verify the implementation of the MOV periodic verification program is in accordance with the licensee's commitments discussed in the enclosed SE; the NRC SE dated October 30, 1997, on the JOG Program on MOV Periodic

- 2 -

Verification; and the NRC SE dated April 14, 1998, on the Westinghouse Owners' Group methodology for MOV risk ranking.

This completes the staff's efforts on TAC Nos. M97037 and M97038. If you have any questions regarding this matter, please contact me at (301) 415-1345.

Sincerely,

***/RA/***

John F. Stang, Senior Project Manager, Section 1  
Project Directorate III  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket Nos. 50-315 and 50-316

Enclosure: Safety Evaluation

cc w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO CLOSEOUT OF LICENSING ACTION FOR GENERIC LETTER 96-05

INDIANA MICHIGAN POWER COMPANY

DONALD C. COOK NUCLEAR PLANT, UNITS 1 AND 2

DOCKET NOS. 50-315 AND 50-316

1.0 INTRODUCTION

Many fluid systems at nuclear power plants depend on the successful operation of motor-operated valves (MOVs) in performing their safety functions. Several years ago, MOV operating experience and testing, and research programs sponsored by the nuclear industry and the U. S. Nuclear Regulatory Commission (NRC), revealed weaknesses in a wide range of activities (including design, qualification, testing, and maintenance) associated with the performance of MOVs in nuclear power plants. For example, some engineering analyses used in sizing and setting MOVs did not adequately predict the thrust and torque required to operate valves under their design-basis conditions. In addition, inservice tests of valve stroke time under zero differential-pressure and flow conditions did not ensure that MOVs could perform their safety functions under design-basis conditions.

Upon identification of the weaknesses in MOV performance, significant industry and regulatory activities were initiated to verify the design-basis capability of safety-related MOVs in nuclear power plants. After completion of these activities, nuclear power plant licensees began establishing long-term programs to maintain the design-basis capability of their safety-related MOVs. This safety evaluation (SE) addresses the program being implemented by American Electric Power Company (AEP, the licensee) to verify periodically the design-basis capability of safety-related MOVs at the D. C. Cook Nuclear Plant, Units 1 and 2.

2.0 REGULATORY REQUIREMENTS

The NRC regulations require that MOVs important to safety be treated in a manner that provides assurance of their intended performance. Criterion 1 to Appendix A, "General Design Criteria for Nuclear Power Plants," to Part 50 of Title 10 of the *Code of Federal Regulations* (10 CFR Part 50) states, in part, that structures, systems, and components important to safety shall be designed, fabricated, erected, and tested to quality standards commensurate with the importance of the safety functions to be performed. The quality assurance program to be applied to safety-related components is described in Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to 10 CFR Part 50. In Section 50.55a of 10 CFR Part 50, the NRC requires licensees to establish inservice testing (IST) programs in accordance with the American Society of Mechanical Engineers (ASME) *Boiler and Pressure Vessel Code*, and more recently the ASME *Code for Operation and Maintenance of Nuclear Power Plants*.

In response to concerns regarding MOV performance, the NRC staff issued Generic Letter (GL) 89-10 (June 28, 1989), "Safety-Related Motor-Operated Valve Testing and Surveillance," which requested that nuclear power plant licensees and construction permit holders ensure the capability of MOVs in safety-related systems to perform their intended functions by reviewing MOV design bases, verifying MOV switch settings initially and periodically, testing MOVs under design-basis conditions where practicable, improving evaluations of MOV failures and necessary corrective action, and trending MOV problems. The staff requested that licensees complete the GL 89-10 program within approximately three refueling outages or 5 years from the issuance of the generic letter. Permit holders were requested to complete the GL 89-10 program before plant startup or in accordance with the above schedule, whichever was later.

The NRC staff issued seven supplements to GL 89-10 that provided additional guidance and information on MOV program scope, design-basis reviews, switch settings, testing, periodic verification, trending, and schedule extensions. GL 89-10 and its supplements provided only limited guidance regarding MOV periodic verification and the measures appropriate to assure preservation of design-basis capability. Consequently, the staff determined that additional guidance on the periodic verification of MOV design-basis capability should be prepared. On September 18, 1996, the NRC staff issued GL 96-05, "Periodic Verification of Design-Basis Capability of Safety-Related Motor-Operated Valves," requesting each licensee establish a program, or ensure the effectiveness of its current program, to verify on a periodic basis that safety-related MOVs continue to be capable of performing their safety functions within the current licensing bases of the facility. In GL 96-05, the NRC staff summarized several industry and regulatory activities and programs related to maintaining long-term capability of safety-related MOVs. For example, GL 96-05 discussed non-mandatory ASME Code Case OMN-1, "Alternative Rules for Preservice and Inservice Testing of Certain Electric Motor Operated Valve Assemblies in LWR Power Plants, OM Code 1995 Edition; Subsection ISTC," which allows the replacement of ASME Code requirements for MOV quarterly stroke-time testing with exercising of safety-related MOVs at least once per operating cycle and periodic MOV diagnostic testing on a frequency to be determined on the basis of margin and degradation rate. In GL 96-05, the NRC staff stated that the method in OMN-1 meets the intent of the generic letter with certain limitations. The NRC staff also noted in GL 96-05 that licensees remain bound by the requirements in their code of record regarding MOV stroke-time testing, as supplemented by relief requests approved by the NRC staff.

In GL 96-05, licensees were requested to submit the following information to the NRC:

- a. within 60 days from the date of GL 96-05, a written response indicating whether or not the licensee would implement the requested actions; and
- b. within 180 days from the date of GL 96-05, or upon notification to the NRC of completion of GL 89-10 (whichever is later), a written summary description of the licensee's MOV periodic verification program.

The NRC staff is preparing an SE on the response of each licensee to GL 96-05. The NRC staff intends to rely to a significant extent on an industry initiative to identify valve age-related degradation which could adversely affect the design-basis capability of safety-related MOVs (described in Section 3.0) where a licensee commits to implement that industry program. The NRC staff will conduct inspections to verify the implementation of GL 96-05 programs at nuclear power plants as necessary.

### 3.0 JOINT OWNERS GROUP PROGRAM ON MOV PERIODIC VERIFICATION

In response to GL 96-05, the Boiling Water Reactor Owners Group (BWROG), Westinghouse Owners Group (WOG), and Combustion Engineering Owners Group (CEOG) jointly developed an MOV periodic verification program to obtain benefits from the sharing of information between licensees. The Joint Owners Group (JOG) Program on MOV Periodic Verification is described by the BWROG in its Licensing Topical Report NEDC-32719, "BWR Owners' Group Program on Motor-Operated Valve (MOV) Periodic Verification," and described by the WOG and the CEOG in their separately submitted Topical Report MPR-1807, "Joint BWR, Westinghouse and Combustion Engineering Owners' Group Program on Motor-Operated Valve (MOV) Periodic Verification." The stated objectives of the JOG program on MOV Periodic Verification are (1) to provide an approach for licensees to use immediately in their GL 96-05 programs; (2) to develop a basis for addressing the potential age-related increase in required thrust or torque under dynamic conditions; and (3) to use the developed basis to confirm, or if necessary to modify, the applied approach. The specific elements of the JOG program are (1) providing an "interim" MOV periodic verification program for applicable licensees to use in response to GL 96-05; (2) conducting a dynamic testing program over the next 5 years to identify potential age-related increases in required thrust or torque to operate gate, globe, and butterfly valves under dynamic conditions; and (3) evaluating the information from the dynamic testing program to confirm or modify the interim program assumptions.

The JOG interim MOV periodic verification program includes (1) continuation of MOV stroke-time testing required by the ASME Code IST program; and (2) performance of MOV static diagnostic testing on a frequency based on functional capability (age-related degradation margin over and above margin for GL 89-10 evaluated parameters) and safety significance. In implementing the interim MOV static diagnostic test program, licensees will rank MOVs within the scope of the JOG program according to their safety significance. The JOG program specifies that licensees need to justify their approach for risk ranking MOVs. In Topical Report NEDC-32264, "Application of Probabilistic Safety Assessment to Generic Letter 89-10 Implementation," the BWROG described a methodology to rank MOVs in GL 89-10 programs with respect to their relative importance to core-damage frequency and other considerations to be added by an expert panel. In an SE dated February 27, 1996, the NRC staff accepted the BWROG methodology for risk ranking MOVs in boiling water reactor nuclear plants with certain conditions and limitations. In the NRC SE (dated October 30, 1997) on the JOG Program on MOV Periodic Verification, the NRC staff indicated its view that the BWROG methodology for MOV risk ranking is appropriate for use in response to GL 96-05. With respect to Westinghouse-designed pressurized water reactor nuclear plants, WOG prepared Engineering Report V-EC-1658, "Risk Ranking Approach for Motor-Operated Valves in Response to Generic Letter 96-05." On April 14, 1998, the NRC staff issued an SE accepting with certain conditions and limitations the WOG approach for ranking MOVs based on their risk significance. Licensees not applicable to the BWROG or WOG methodologies need to justify their MOV risk-ranking approach individually.

The objectives of the JOG dynamic test program are to determine degradation trends in dynamic thrust and torque, and to use dynamic test results to adjust the test frequency and method specified in the interim program if warranted. The JOG dynamic testing program includes (1) identification of conditions and features which could potentially lead to MOV degradation; (2) definition and assignment of valves for dynamic testing; (3) testing valves three times over a 5-year interval with at least a 1-year interval between valve-specific tests according

to a standard test specification; (4) evaluation of results of each test; and (5) evaluation of collective test results.

In the last phase of its program, JOG will evaluate the test results to validate the assumptions in the interim program to establish a long-term MOV periodic verification program to be implemented by licensees. A feedback mechanism will be established to ensure timely sharing of MOV test results among licensees and to prompt individual licensees to adjust their own MOV periodic verification program, as appropriate.

Following consideration of NRC staff comments, BWROG submitted Licensing Topical Report NEDC-32719 (Revision 2) describing the JOG program on July 30, 1997. Similarly, the CEOG and the WOG submitted Topical Report MPR-1807 (Revision 2) describing the JOG program on August 6 and 12, 1997, respectively. On October 30, 1997, the NRC staff issued an SE accepting the JOG program with certain conditions and limitations as an acceptable industry-wide response to GL 96-05 for valve age-related degradation. On October 19, 1999, the Babcock & Wilcox Owners Group (B&WOG) forwarded Topical Report MPR-1807 (Revision 2) to the NRC, and stated that B&WOG is now participating in the JOG Program on MOV Periodic Verification. In a letter dated May 15, 2000, the NRC staff informed B&WOG that Topical Report MPR-1807 is acceptable for referencing in B&WOG licensing applications to the extent specified and under the limitations delineated in the report and the associated NRC SE dated October 30, 1997.

#### 4.0 D. C. COOK GL 96-05 PROGRAM

On November 7, 1996, AEP submitted a 60-day response to GL 96-05 notifying the NRC that it planned to meet the intent of GL 96-05 at D. C. Cook Nuclear Plant, Units 1 and 2. On April 18, 1997, the licensee submitted a 180-day response to GL 96-05 providing a summary description of the MOV periodic verification program to be implemented at D. C. Cook. In submittals dated January 11, and December 15, 2000, the licensee updated its plans for implementing GL 96-05. On May 14 to 18, 2001, the NRC staff conducted an inspection at D. C. Cook to determine whether the licensee's MOV program is consistent with its commitments in response to GL 96-05. The staff documented the results of the GL 96-05 inspection at D. C. Cook in Inspection Report (IR) 50-315 and 50-316/01-05 (DRS), dated June 12, 2001. In response to an NRC staff finding during that inspection, the licensee provided a specific commitment in a letter dated June 22, 2001, to implement the JOG Program on MOV Periodic Verification as part of its response to GL 96-05.

As described in the licensee's submittal dated December 15, 2000, and NRC IR 01-05, the licensee has developed an MOV periodic verification program in response to GL 96-05 based on the JOG Program on MOV Periodic Verification. The licensee's MOV periodic verification program includes the interim static MOV diagnostic testing recommended by JOG at intervals based on MOV risk importance and available capability margin. The licensee is performing dynamic tests of a sample of MOVs in accordance with the JOG dynamic testing program. The licensee is also continuing the ASME IST provisions of MOV stroke-time testing. The licensee is updating its MOV calculations for predicting MOV actuator output based on recent industry information. The licensee is collecting test data from its static and dynamic MOV tests for monitoring and trending of MOV performance.



## 5.0 NRC STAFF EVALUATION

The NRC staff has reviewed the information provided in the licensee's submittals and the applicable NRC inspection reports describing the program to verify periodically the design-basis capability of safety-related MOVs at D. C. Cook in response to GL 96-05. NRC IRs 50-315 and 316/91009, 93006, 95006, 96012, 98020, 2000002, and 01-05 provide the results of inspections to evaluate the licensee's program at D. C. Cook to verify the design-basis capability of safety-related MOVs in response to GL 89-10. In IR 01-05, the staff closed the review of the GL 89-10 program at D. C. Cook. Also in IR 01-05, the staff provides the results of its review of the GL 96-05 program at D. C. Cook. The staff's evaluation of the licensee's response to GL 96-05 is described below.

### 5.1 MOV Program Scope

In GL 96-05, the NRC staff indicated that all safety-related MOVs covered by the GL 89-10 program should be considered in the development of the MOV periodic verification program. The staff noted that the program should consider safety-related MOVs that are assumed to be capable of returning to their safety position when placed in a position that prevents their safety system (or train) from performing its safety function; and the system (or train) is not declared inoperable when the MOVs are in their nonsafety position.

In IR 01-05, the NRC staff reported that the scope of the GL 96-05 program established by the licensee at D. C. Cook currently is the same as the scope of its GL 89-10 program. In its submittal dated December 15, 2000, the licensee indicated that a preliminary review did not reveal any additional MOVs to be addressed as a result of the recommendation in GL 96-05 to consider safety-related MOVs that are assumed to be capable of returning to their safety position when placed in a position that prevents their safety system (or train) from performing its safety function; and the system (or train) is not declared inoperable when the MOVs are in their nonsafety position. In the December 15, 2000, submittal, the licensee committed to confirm, prior to the next refueling outage for each reactor unit, that the population of the MOV periodic verification program at D. C. Cook is in accordance with the GL 96-05 recommendations.

The NRC staff considers the licensee to have made adequate commitments regarding the scope of its MOV program at D. C. Cook.

### 5.2 MOV Assumptions and Methodologies

Licensees maintain their assumptions and methodologies used in the development of MOV programs consistent with the plant configuration throughout the life of the plant (a concept commonly described as a "living program"). For example, the design basis of safety-related MOVs is maintained up to date, including consideration of any plant modifications or power uprate conditions.

In IR 01-05, the NRC staff reported that the licensee's MOV program procedure specifies that the MOV periodic verification process provide assurance that the design inputs to the MOV calculations at D. C. Cook remain valid. The licensee will address new information as it becomes available from such sources as plant diagnostic tests, industry testing, NRC and vendor notices, the MOV Joint Owners Group, and the MOV Users Group. During the inspection, the staff found that the licensee was maintaining its design-basis assumptions up to

date, including revision of its MOV calculations to reflect recent actuator output methodologies for ac-powered and dc-powered MOVs.

The NRC staff considers the licensee to have adequate processes in place to maintain the assumptions and methodologies used in its MOV program, including the design basis of its safety-related MOVs.

### 5.3 GL 89-10 Long-Term Items

The licensee has established action items in its MOV Engineering Action Plan to track the completion of long-term items that were identified during the completion of the GL 89-10 program at D. C. Cook. One long-term item involves obtaining information to address the limitations and conditions for use of the Electric Power Research Institute (EPRI) MOV Performance Prediction Methodology (PPM) in determining valve operating requirements specified in an NRC SE (dated March 15, 1996) and its first supplement (dated February 20, 1997). Another long-term item involves obtaining industry information regarding operating requirements for MOVs determined by methods other than the EPRI MOV PPM, such as where the EPRI methodology could only be used as best available data. A third long-term item involves implementing margin improvement activities for specific MOVs with a capability margin determined to be less than 5 percent. In IR 01-05, the NRC staff reported that the licensee is addressing the long-term items from its GL 89-10 program.

In GL 89-10, the NRC staff identified pressure locking and thermal binding as potential performance concerns for safety-related MOVs. The NRC staff completed its review of the licensee's actions at D. C. Cook in response to GL 95-07, "Pressure Locking and Thermal Binding of Safety-Related Power-Operated Gate Valves," in an SE dated July 17, 2000.

In GL 89-10, the NRC staff recommended that MOV performance be trended on a long-term basis. As reported in IR 01-05, the licensee will continue to trend quantitative and qualitative aspects of MOV performance to ensure that program assumptions remain valid. The specific parameters to be trended include as-found and as-left stem friction coefficients; MOV capability margin; motor current and voltage (or motor power); gate valve pullout force; running load for valve opening and closing strokes; and butterfly valve seating torque. The licensee will prepare MOV evaluation reports to identify performance trends after each refueling outage or at least every 2 years through a review of MOV failure and deficiency data, diagnostic test results, and industry information. The licensee will obtain MOV failure and deficiency data from condition reports and job orders, including such information as the valves tested, valve failures, valve modifications, valve preventative maintenance, and comparison to previous reports. The licensee established an action item in its Engineering Action Plan to prepare guidance for the implementation of its MOV trending activities.

With the licensee's ongoing MOV activities and trending program, no outstanding issues regarding the licensee's GL 89-10 program remain at D. C. Cook.

### 5.4 JOG Program on MOV Periodic Verification

In its letter dated December 15, 2000, the licensee stated that it is participating in the JOG Program on MOV Periodic Verification established in response to GL 96-05. The JOG Program consists of three phases: (1) interim static diagnostic testing with specific MOV test frequencies

based on margin and risk significance; (2) repetitive dynamic diagnostic testing of a sample of MOVs over a 5-year period; and (3) long-term periodic verification testing based on the results of the dynamic test data. The NRC staff prepared an SE dated October 30, 1997, accepting the JOG program as an industry-wide response to GL 96-05 with certain conditions and limitations. In IR 01-05, the staff reported that the licensee is addressing the conditions and limitations for the use of the JOG topical report on MOV periodic verification specified in the NRC SE. In response to the NRC inspection findings, the licensee committed to implement all three phases of the JOG program in its submittal dated June 22, 2001. The staff considers the licensee's commitment to all three phases of the JOG Program on MOV Periodic Verification to be an acceptable response to GL 96-05 for valve age-related degradation at D. C. Cook.

As part of Phase 1 of the JOG program, the licensee established an interim static diagnostic testing program for its GL 96-05 MOVs based on capability margin and risk significance. The licensee applied an initial MOV risk ranking in determining the static diagnostic test intervals for its GL 96-05 MOVs. In its December 15, 2000, letter, the licensee committed to complete a final risk ranking of its GL 96-05 MOVs using the WOG methodology by December 31, 2001, and to adjust the MOV test frequencies accordingly. The NRC staff reviewed and accepted the WOG methodology for risk ranking MOVs with certain conditions and limitations in an SE dated April 14, 1998. In determining intervals for verifying MOV capability, the licensee used plant-specific information to establish more frequent verification of MOV capability for some GL 96-05 MOVs at D. C. Cook than recommended by the JOG program test matrix. For example, the licensee indicated that the pressurizer power-operated relief valve block valves are typically overhauled every refueling cycle because of the high ambient temperature in their location. The staff considers the licensee's activities for establishing its interim MOV periodic verification program at D. C. Cook to be acceptable.

As part of its participation in Phase 2 of the JOG program, the licensee conducted static and dynamic diagnostic tests of four butterfly valves in the GL 96-05 program at D. C. Cook. The licensee provided the test information to JOG and is conducting follow-up activities. Following completion of the Phase 2 dynamic testing program, JOG will update its topical report on the MOV periodic verification program to provide the long-term testing program. In its submittal dated June 22, 2001, the licensee committed to implement the long-term JOG periodic verification test program to support closure of the NRC staff review of the GL 96-05 program at D. C. Cook.

The JOG program is intended to address most gate, globe and butterfly valves used in safety-related applications in the nuclear power plants of participating licensees. JOG indicates that each licensee is responsible for addressing any MOVs outside the scope of applicability of the JOG program. The NRC staff recognizes that JOG has selected a broad range of MOVs and conditions for the dynamic testing program, and that significant information will be obtained on the performance and potential degradation of safety-related MOVs during the interim static diagnostic test program and the JOG dynamic test program. As the test results are evaluated, the JOG might include or exclude additional MOVs with respect to the scope of its program. Although the test information from the MOVs in the JOG dynamic test program might not be adequate to establish a long-term periodic verification program for each MOV outside the scope of the JOG program, sufficient information should be obtained from the JOG dynamic test program to identify any immediate safety concern for potential valve age-related degradation during the interim period of the JOG program. Therefore, the NRC staff considers it acceptable for the licensee to apply its interim static diagnostic test program to GL 96-05 MOVs that might

be identified as outside the scope of the JOG program with the feedback of information from the JOG dynamic test program to those MOVs. As indicated in the NRC SE dated October 30, 1997, licensees implementing the long-term JOG program must determine any MOVs outside the scope of the JOG program (including service conditions) and justify a separate program for periodic verification of the design-basis capability (including static and dynamic operating requirements) of those MOVs. With regard to the GL 96-05 program at D. C. Cook, the NRC staff noted in IR 01-05 that the licensee's MOV Program procedure describes the evaluation of the applicability of the JOG program to the GL 96-05 MOVs. For example, the licensee might consider MOVs sized and set using the EPRI MOV PPM to have high margin, but these MOVs remain within the scope of the GL 96-05 program for periodic verification. In accordance with its MOV program, the licensee will establish a separate effort at D. C. Cook for periodic verification of the design-basis capability for MOVs, including materials and service conditions, determined not to be applicable to the JOG program.

### 5.5 Motor Actuator Output

The JOG program focuses on the potential age-related increase in the thrust or torque required to operate valves under their design-basis conditions. In the SE dated October 30, 1997, on the JOG program, the NRC staff specifies that licensees are responsible for addressing the thrust or torque delivered by the MOV motor actuator and its potential degradation. Although JOG does not plan to evaluate degradation of motor actuator output, significant information on the output of motor actuators will be obtained through the interim MOV static diagnostic test program and the JOG dynamic test program. Several parameters obtained during MOV static and dynamic diagnostic testing help identify motor actuator output degradation when opening and closing the valve including, as applicable, capability margin, thrust and torque at control switch trip, stem friction coefficient, load sensitive behavior, and motor current.

As reported in IR 01-05, the licensee monitors and maintains the output capability of its GL 96-05 MOVs at D. C. Cook by a combination of periodic testing and preventive maintenance. For example, the licensee performs "as found" and "as left" testing to determine changes in MOV performance. The licensee trends MOV output performance parameters such as thrust and torque delivered at control switch trip, stem factor (or stem friction coefficient), and motor inrush and running current. The licensee conducts periodic maintenance activities, such as lubrication of valve stems of the GL 96-05 MOVs every refueling cycle.

In Technical Update 98-01 and its Supplement 1, Limitorque Corporation provided updated guidance for predicting the torque output of its ac-powered motor actuators. At D. C. Cook, the licensee updated its MOV calculations to resolve the industry-wide concerns regarding the output of ac-powered MOVs. In revising its MOV calculations, the licensee applied the guidance for predicting the output of ac-powered MOVs provided in Limitorque Technical Update 98-01 or used an alternate method based on motor testing conducted by Commonwealth Edison Company (ComEd) and further supported by analysis conducted by the licensee's contractor Kiran Consulting Incorporated (KCI). In IR 01-05, the NRC staff found the licensee's justification for its KCI/ComEd alternate method for predicting ac-powered MOV output to be acceptable. The licensee has established action items to modify several MOVs to reflect the updated calculations for MOV operating requirements and actuator output.

In its letter dated July 17, 1998, forwarding Technical Update 98-01, Limitorque indicates that a future technical update will be issued to address the application of dc-powered MOVs. As

noted in IR 01-05, the licensee has revised (or is in the process of revising) its calculations for the prediction of the output of most dc-powered MOVs at D. C. Cook. The licensee's revised calculations apply a methodology recently developed by the BWROG to resolve concerns regarding past industry guidance for predicting the output and stroke time of dc-powered MOVs. The licensee had not identified any capability issues resulting from the implementation of the updated methodology for dc-powered MOV output. The licensee also plans to update its guidance for performing MOV calculations to reflect the new dc-powered MOV output methodology.

Any MOV operability concerns that might be identified in the future will be processed in accordance with established regulatory requirements and plant-specific commitments.

The NRC staff considers the licensee to be establishing sufficient means to monitor MOV motor actuator output and its potential degradation.

## 6.0 CONCLUSION

The NRC staff finds that the licensee has established an acceptable program to verify periodically the design-basis capability of the safety-related MOVs at D. C. Cook through its commitment to all three phases of the JOG Program on MOV Periodic Verification; and the additional actions described in the licensee's submittals and the applicable NRC inspection reports. Therefore, the staff concludes that the licensee has adequately addressed the actions requested in GL 96-05. The NRC staff may conduct additional inspections at D. C. Cook to verify the implementation of the MOV periodic verification program is in accordance with the licensee's commitments discussed in the attached SE; the NRC SE dated October 30, 1997, on the JOG Program on MOV Periodic Verification; and the NRC SE dated April 14, 1998, on the Westinghouse Owners' Group methodology for MOV risk ranking.

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